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REMARKS

This is a full and timely response to the final Official Action mailed May 2, 2007.

Reconsideration of the application in light of the following remarks is respectfully requested.

Request for Continued Examination:

Applicant hereby requests Continued Examination for this application and entry and consideration of this amendment consequent thereto.

Claim Status:

Claims 1-50 are currently pending for further action.

Prior Art:

Claims 1-4, 10-12, 17-22, 28-30, 35-38 and 44-46 were rejected as anticipated under 35 U.S.C. § 102(e) by U.S. Patent App. Pub. No. 2003/0090597 to Katoh et al. ("Katoh"). For at least the following reasons, this rejection is respectfully traversed.

There appears to be a fundamental confusion in this matter over the term "sub-frame," which unfortunately has two entirely different meanings in the present application and the applied prior art. In one context, a "sub-frame" is a single color component of a full color frame. For example, a single full color frame may be divided into red (R), blue (B) and green (G) sub-frames.

Katoh uses the term "sub-frame" in this color-component context, but teaches a spatial shift of sequential color component images for the purpose of merging colors. According to Katoh,

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each image subframe on the projection plane is made up of pixels representing the color of the R, G or B light ray. However, the R, G and B image subframes are displayed time-sequentially at very short time intervals, which are even shorter than the time resolution of the human visual sense. Consequently, a color image is recognized by the human eyes as an afterimage.

In contrast, according to the present invention, each image subframe is formed by combining the R, G and B light rays with each other as will be described in detail later. That is to say, in a subframe period, the projection plane is irradiated with the R, G and B light rays that have been modulated by the image display panel. *Each of the R, G and B light rays that have been modulated by the image display panel irradiates one position on the projection plane in one subframe period but irradiates another position on the projection plane in the next subframe period.* Then, those light rays are synthesized together with time, thereby displaying a full-color image frame thereon. (Katoh, paragraphs 0155-6) (emphasis added).

Thus, Katoh teaches shifting the position of an R, G or B color sub-frame in successive "subframe periods" for the purpose of merging colors.

In contrast, the term sub-frame has an entirely different meaning in the context of wobulation. Wobulation is a technique used "to enhance image resolution and hide pixel inaccuracies." (Applicant's specification, paragraph 0024). In wobulation, each frame of an image is divided into wobulation sub-frames, for example by putting every other pixel in a line into different sub-frames. (Applicant's specification, Fig. 9 and related text). If the display is color, the full color frame is first divided into color components, perhaps also called sub-frames. Then, the single color sub-frame is further divided into wobulation sub-frames.

Then, a "wobbling device shifts the pixels such that each wobulation sub-frame is displayed by the display optics (105) in a slightly different spatial position than the previously displayed image sub-frame. The wobbling device (104) may shift the pixels such that the image sub-frames are offset from each other by a vertical distance and/or by a horizontal distance." (Applicant's specification, paragraph 0033). This shifting results, as indicated, in the perception by the viewer of enhanced resolution, i.e., a greater number of pixels than actually exist, with fewer pixel inaccuracies. The wobulation sub-frames mentioned are

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created specifically for the wobulation technique being performed and are not dependent on or necessarily related to the color components of an image frame.

Katoh does not teach or suggest a wobulation system. Katoh does not even mention wobulation. Consequently, Katoh uses the term sub-frame only to refer to the single color components of a full color frame that are "synthesized together with time" in a given "subframe period." (Katoh, paragraph 0156). Katoh does not teach or suggest the creation of wobulation sub-frames, as described and claimed by Applicant, for example by putting every other pixel in a line into different wobulation sub-frames. (Applicant's specification, Fig. 9). Therefore, Katoh clearly has nothing to do with the claimed subject matter.

It should also be noted that, in a wobulation system, the relative shifting of successive wobulation sub-frames is by an offset amount less than a pixel width, as illustrated in Applicant's specification at, for example, Fig. 5C and Fig. 6B. It is this shifting by less than a pixel width that increases the resolution of the resulting image causing it to appear that there are more pixels, more densely arranged, than there really are.

Consequently, to more clearly distinguish Applicant's claims from the unrelated subject matter of Katoh, Applicant has herein amended the foregoing claims to recite displaying each of said image sub-frames offset from a previous image sub-frame "*by an offset distance less than a pixel width.*" (Emphasis added).

This is in direct and explicit contrast to the teachings of Katoh which require that the shifting for color merging, rather than wobulation, be done by integral pixel amounts. According to Katoh, "[t]he shift amount of the subframes on the projection plane is preferably approximately an integral number of times as long as one pixel pitch as measured on the projection plane in the shifting direction." (Katoh, paragraph 0041).

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Turning to the claims themselves, claim 1 recites:

A display system for displaying an interlaced image frame, said interlaced image frame comprising a top field and a bottom field, said top and bottom fields each having lines of pixels, said system comprising:

an image processing unit configured to process a stream of pixel data elements sequentially corresponding to said pixels in said top and bottom fields and generate a number of image sub-frames;

a modulator configured to generate a light beam bearing said number of image sub-frames; and

a wobbling device configured to displace said light beam such that each of said image sub-frames is spatially displayed offset from a previous image sub-frame by an offset distance less than a pixel width;

wherein at least one of said image sub-frames is generated using only said pixel data elements in said top field and at least one of said image sub-frames is generated using only said pixel data elements in said bottom field.

(Emphasis added).

As noted above, support for these amendments can be found in Applicant's originally filed specification at, for example, Figs. 5C and 6B and the related text. Applicant further notes that these amendments, while serving to clarify the distinctions between the claimed subject matter and the teachings of Katoh, do not change or narrow the scope of the claims in any degree.

In contrast, Katoh does not teach or suggest the claimed wobbling device configured to display the light beam of each image sub-frame "by an offset distance less than a pixel width." For at least this reason, Katoh cannot anticipate or render obvious claim 1.

Additionally, Applicant's claim 1 recites a new relationship between the fields of an interlaced video signal and the sub-frames generated *for wobulation*. Specifically, rather than converting the interlaced video to progressive video so that it can be processed similar to any other image frame, claim 1 recites that at least one image sub-frame is formed using only data from a specific, i.e., top field, of an image frame and another at least one image sub-frame is formed using only data from a specific, i.e., bottom field, of the image frame. Katoh does not remotely suggest this subject matter. Katoh does not teach or suggest any such relationship

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between the separate fields of interlaced video and sub-frames subsequently generated for wobulation. As noted, Katoh has virtually nothing to do with the claimed subject matter.

"A claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987) (emphasis added). See M.P.E.P. § 2131. For at least these reasons, the rejection of claim 1 and its dependent claims should be reconsidered and withdrawn.

Independent claim 18 recites:

A method of displaying an interlaced image frame, said interlaced image frame comprising a top field and a bottom field, said top and bottom fields each having lines of pixels, said method comprising:

processing a stream of pixel data elements sequentially corresponding to said pixels in said top and bottom fields and *generating a number of wobulation image sub-frames corresponding to said top and bottom fields*; and

displaying each of said image sub-frames offset from a previous image sub-frame *by an offset distance less than a pixel width*.

(Emphasis added).

Again, support for these amendments can be found in Applicant's originally filed specification at, for example, Figs. 5C and 6B and the related text. Applicant further notes that these amendments, while serving to clarify the distinctions between the claimed subject matter and the teachings of Katoh, do not change or narrow the scope of the claims in any degree.

In contrast to claim 18, as explained above, the cited prior art, including Katoh, has not taught or suggested "displaying each of said image sub-frames offset from a previous image sub-frame *by an offset distance less than a pixel width*." Katoh further does not teach or suggest "generating a number of *wobulation* image sub-frames." As demonstrated above, Katoh has nothing to do with and does not mention wobulation. Katoh further fails to teach

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or suggest "generating wobulation image sub-frames for wobulation where the image sub-frames correspond to top and bottom fields of an interlaced image frame."

Thus, Katoh fails to teach or suggest several features of the claimed method. "A claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987) (emphasis added). See M.P.E.P. § 2131. For at least these reasons, the rejection of claim 18 and its dependent claims should be reconsidered and withdrawn.

Independent claim 36 recites:

A system for displaying an interlaced image frame, said interlaced image frame comprising a top field and a bottom field, said top and bottom fields each having lines of pixels, said system comprising:

means for processing a stream of pixel data elements sequentially corresponding to said pixels in said top and bottom fields and *generating a number of wobulation image sub-frames corresponding to said top and bottom fields*; and

means for displaying each of said image sub-frames offset from a previous image sub-frame *by an offset distance less than a pixel width*.

(Emphasis added).

Again, support for these amendments can be found in Applicant's originally filed specification at, for example, Figs. 5C and 6B and the related text. Applicant further notes that these amendments, while serving to clarify the distinctions between the claimed subject matter and the teachings of Katoh, do not change or narrow the scope of the claims in any degree.

In contrast to claim 36, as explained above, the cited prior art, including Katoh, has not taught or suggested "means for displaying each of said image sub-frames offset from a previous image sub-frame *by an offset distance less than a pixel width*." To the extent Katoh is even relevant, it teaches away from this concept. Katoh further does not teach or suggest

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means for "generating a number of *wobulation* image sub-frames." As demonstrated above, Katoh has nothing to do with and does not mention wobulation. Katoh further fails to teach or suggest means for "generating wobulation image sub-frames for wobulation where the image sub-frames correspond to top and bottom fields of an interlaced image frame."

Thus, Katoh fails to teach or suggest several features of the claimed system. "A claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987) (emphasis added). See M.P.E.P. § 2131. For at least these reasons, the rejection of claim 36 and its dependent claims should be reconsidered and withdrawn.

Additionally, as would be expected, the various dependent claims of the application recite additional subject matter that is not taught or suggested by Katoh. For example, claim 2 recites "wherein said image processing unit is configured to process said pixel data elements in said top field to generate a first image sub-frame and said pixel data elements in said bottom field to generate a second image sub-frame." In this regard, the misguided Office Action cites a portion of Katoh (paragraph 0026) that describes the conventional method of generating sub-frames from a non-interlaced video frame without reference or regard to the fields of an interlaced image frame. (Action of 5/2/07, p. 5). Consequently, the cited portion of Katoh clearly has nothing to do with the subject matter of claim 2.

A similar example could be made for virtually any of the independent claims of the application given the utter inapplicability of Katoh to the claimed subject matter.

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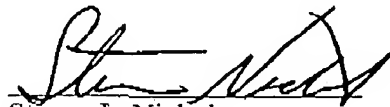
Claims 5, 23 and 39 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Katoh and U.S. Patent No. 6,680,748 to Monti ("Monti"). Claims 6-9, 13-16, 24-27, 31-34, 40-43 and 47-50 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Katoh and U.S. Patent No. 5,581,302 to Ran et al. ("Ran"). These rejections are respectfully traversed for at least the same reasons given above with respect to the independent claims of the application.

Conclusion:

For the foregoing reasons, the present application is thought to be clearly in condition for allowance. Accordingly, favorable reconsideration of the application in light of these remarks is courteously solicited. If the Examiner has any comments or suggestions which could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the number listed below.

Respectfully submitted,

DATE: June 29, 2007

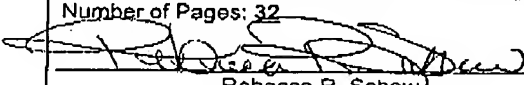

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